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administering to said patient a composition according to claim 66.

REMARKS

The Amendments to the Specification and Claims:

Applicants have amended the specification at page 1 to correctly cross-reference the present application to earlier applications from which it claims priority.

Applicants have amended pending claims 18, 22-24, 29 and 38. Applicants have added claims 39-67.\* Therefore, claims 4-12, 15 and 18-67 are pending.

Applicants have amended claim 18 to depend from claim 39, and have added the word "is" to improve its form.

Applicants have amended claim 22 to depend from claim 39. Applicants have deleted compounds 203-207, because these compounds do not fall within genus (Ie) as amended in response to the January 27, 2000 restriction requirement. Further, applicants have deleted compound 201 (now claimed in added claim 47).

Applicants have amended claim 23 to depend from claim 39. Applicants have deleted compound 384, as that compound does not fall within genus (Ig) as amended in response to the restriction requirement. Applicants have also deleted compounds 309 and 202/301 (now claimed in added claim 48 and 49, respectively).

Applicants have deleted compound 412 in claim 24, as that compound does not fall within genus (Ih) as amended in response to the restriction requirement.

Applicants have amended claim 29 to improve its form.

Applicants have amended claim 38 to delete the (Ie) and (Ig) genera from claim 38 and to improve its form.

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\* Applicants have enclosed Appendix A, which sets forth the amendments to the claims, along with the Added claims. Deleted matter is shown by brackets, while added matter is shown by underlining.

Applicants have also deleted the definition of the Q<sub>3</sub> substituent because that substituent does not appear in genera (If) and (Ih). Applicants have also amended claim 38 to correct the generic structures of formulae (If) and (Ih). Applicants inadvertently left out the Y radicals in these structures in their March 20, 2001 response. Support for this amendment may be found on page 35, lines 4-5 of the specification and in originally-filed claim 3.

Applicants have added claim 39, which is directed to genera (Ie) and (Ig), with the exception of compounds 201, 309 and 202/301. Support for claim 39 may be found at page 35, lines 4-5 and originally-filed claim 3. Further support for this claim is presented below in the discussion of the rejection under 35 U.S.C. § 102(e).

Applicants have added claims 40-45, which depend directly or indirectly from claim 39. Support for these claims may be found in originally-filed claims 8-11 and 15, respectively. Applicants have further added composition and method claims 49-61. Support for these claims may be found in originally-filed claims 25-37, respectively. Further support for these added claims is presented below in the discussion of the rejection under 35 U.S.C. § 102(e).

Applicants have added claims 46-48, which are directed to compounds 201, 309 and 202/301, respectively. Support for these claims may be found at pages 40-42 and in originally-filed claims 22 and 23. Claims 62-67 are directed to compositions comprising the compounds of claims 46-48, and methods of treatment using these compositions. Support for these claims may be found originally-filed claims 25 and 26, respectively.

None of the above amendments adds new subject matter. Their entry is requested.

Applicants reserve the right to prosecute any subject matter that may have been canceled through amendments of the claims herein in this or in subsequently-

filed applications claiming benefit of priority to this application.

I. The Rejections Under 35 U.S.C. § 112, Paragraph 2

The Examiner has rejected claims 38, 4-12, 15 and 18-37 under 35 U.S.C. § 112, second paragraph for allegedly being indefinite.

The Examiner states that claim 38 is indefinite because although none of the structures therein contain the variable "Y," the claim provides a definition for "Y". Applicants have amended claim 38 to properly recite the structures of genera (If) and (Ih), which include the Y substituent.

The Examiner states that claims 15 and 22-24 are indefinite because there is no antecedent basis for "each R attached to Y" in claim 38, upon which claims 15 and 22-24 are dependent. As discussed above, applicants have amended the genera formulae in claim 38, such that there is proper antecedent basis for this phrase.

The Examiner states that claim 22 is indefinite because compounds 203-207, which contain 1,2-diazine rings, are not encompassed by claim 38. In accordance with the Examiner's suggestions, applicants have deleted compounds 203-207.

The Examiner states that claims 23 and 24 are indefinite because compound 384 (in claim 23) and compound 412 (in claim 24), both of which contain 1,4-diazine rings, are not encompassed by claim 38. In accordance with the Examiner's suggestions, applicants have deleted compounds 384 and 412 from claims 23 and 24, respectively.

The Examiner has rejected claims 4-12, 18-21, and 25-37 because they depend from claims 38, 15 and 22-24. In view of applicants' amendments to claims 38 and 22-24, applicants believe that the rejection of claims 4-12, 18-21, and 25-37 has now been obviated.

II. The Rejection Under 35 U.S.C. § 102(e)

The Examiner has rejected claims 38, 4-12, 15, 18-20, 23, and 25 as anticipated by U.S. Patent No. 5,945,418 ("the '418 patent"). The Examiner states that the instantly-claimed compounds read on compound 309, disclosed in the '418 patent at col.25, ll. 22-34.

The Examiner has also rejected claims 38, 4-12, 15, 18-20, 22-23, and 25 as anticipated by U.S. Patent No. 6,147,080 ("the '080 patent"). The Examiner asserts that the instantly-claimed compounds read on:

- (1) the compound disclosed in the '080 patent at col. 31, ll. 34-35,\* which is identical to compound 309 recited in rejected claim 23;
- (2) compound 201, disclosed in the '080 patent at col. 35, which is identical to compound 201 recited in rejected claim 22; and
- (3) compound 202, disclosed in the '080 patent at col. 39, which is identical to compound 202/301 recited in rejected claim 23.

Applicants have obviated the Examiner's rejection of claims 38, 4-12, and 15 by amending claim 38 to recite only the (If) and (Ih) genera. Further, applicants have obviated a rejection under 35 U.S.C. § 102(e) for added claims 39-45 and amended claims 18-20, 23 and 25 by "carving out" compounds 309, 201, and 202/301 from the (Ie) and (Ig) genera. By separating these three compounds from (Ie) and (Ig), claim 39 is neither anticipated nor rendered obvious by the '080 or the '418 patents.

Support for the amended genera of claim 39 may be found throughout the specification, e.g., pages 35-50. Tables 3 and 4 together disclose a large number of exemplary compounds that fall within the scope of added claim 39. Further, the specification provides a large number of

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\* The Examiner states that the compound at col. 31, ll. 34-45 of the '080 patent is identical to compound #309 recited in rejected claim 23. Applicants respectfully suggest that the compound to which the Examiner refers is in fact disclosed at col. 32, ll. 15-30.

embodiments of Q<sub>3</sub> and Q<sub>2</sub>. See, e.g., pages 12-14 for examples of preferred Q<sub>2</sub> embodiments and page 36 for examples of preferred Q<sub>3</sub> embodiments. Accordingly, it is clear that applicants were in full possession of the claimed genera as well as the individual species at the time of filing (as well as the compositions and methods of treatment based on those compounds), as required by 35 U.S.C. § 112, paragraph 1.

In re Johnson, 194 USPQ 187 (CCPA 1977) (see Appendix B), supports of applicants' exclusion of the species at issue from the claimed genera. In Johnson, a genus of polymers, represented by the formula -O-E-O-E'-, wherein E and E' were described by name, was claimed in a CIP application in the same fashion as it was disclosed in the grandparent application, but with the proviso that two compounds were excluded (the subject of a lost interference count). Johnson at 191.

The CCPA stated that the issue was whether, after exclusion of the two compounds, the grandparent application's disclosure provided written description for the limited genus. Id. at 195. The CCPA concluded that the claimed genus was indeed supported, in view of the extensive number of choices of E and E' substituents that were described, as well as the number of species of polyarylene polyethers (the -O-E-O-E'- polymer) that were disclosed in the grandparent specification. Id. The CCPA further noted that:

The notion that one who fully discloses, and teaches those skilled in the art how to make and use, a genus and numerous species there within, has somehow failed to disclose, and teach those skilled in the art how to make and use, that genus minus two of those species, and has thus failed to satisfy the requirements of § 112, first paragraph, appears to result from a hypertechnical application of legalistic prose relating to that provision of the statute. All that happened here is that appellants narrowed their claims to avoid having them read on a lost interference count.

Id. (citation omitted). The CCPA further noted that "applicants frequently discover during the course of prosecution that only a part of what they invented and originally claimed is patentable." Id.

The same reasoning applies in the present case. The Examiner rejected claim 38 as unpatentable under 35 U.S.C. § 102(e), asserting that compounds 309, 201, and 202/301, disclosed in either or both of the '418 and the '080 patents, were encompassed by either genera (Ie) and (Ig). Accordingly, applicants have separated (Ie) and (Ig) into added claim 39 and excluded compounds 309, 201 and 202/301 from the claimed genera.\* As in Johnson, a number of choices for the substituents on genera (Ie) and (Ig), including the substituents Q<sub>2</sub>, Q<sub>3</sub>, X and R (see pages 6-8, 12-14 and 35-36 of the specification). In addition, applicants have described a number of specific compounds of genera (Ie) and (Ig) (See Tables 3-4, 30-40-50 of the specification). Thus, there is adequate written description for the more limited genera of (Ie) and (Ig), as claimed in claim 39, because these genera are supported by a number of examples in the specification.

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\* Applicants have separately claimed species 309, 201 and 202/301 in added claims 46-48.

Conclusion

Applicants request that the amendments herewith be entered, the accompanying arguments be considered and the claims be allowed to pass to issue.

Respectfully submitted,

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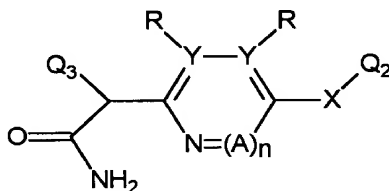
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APPENDIX A

18. (Twice amended) The compound according to claim [38] 39, wherein  $Q_3$  is substituted with 2 to 4 substituents, wherein at least one of said substituents is present in the ortho position relative to the point of attachment of  $Q_3$  to the compound.

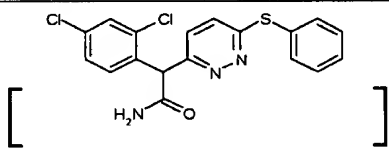
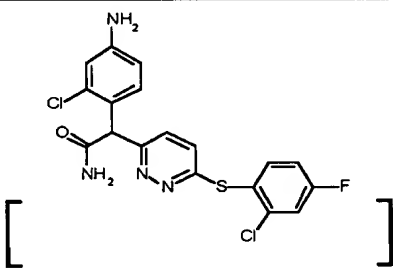
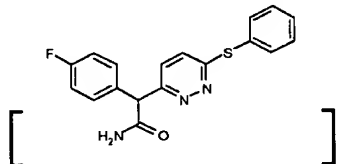
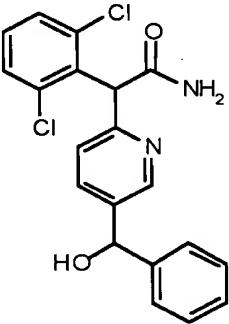
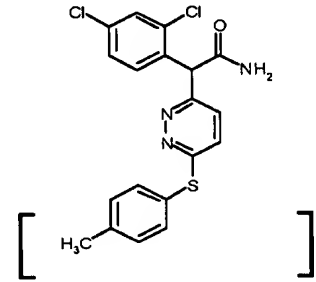
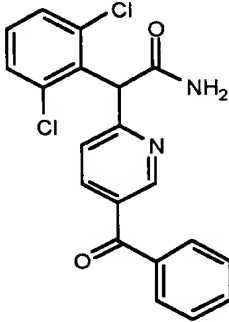
22. (Twice amended) The compound according to claim [38] 39, wherein said compound is a compound of formula Ie:



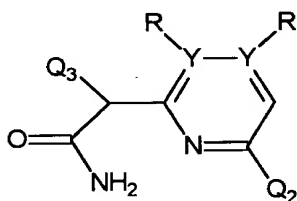
and is selected from any one of the following compounds:

cpd #	Structure	cpd #	Structure
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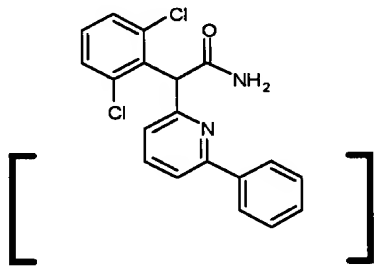
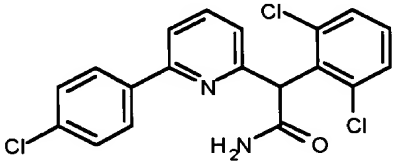
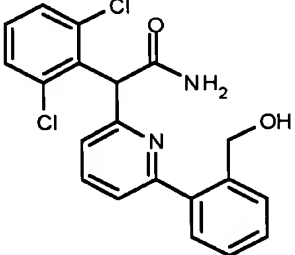
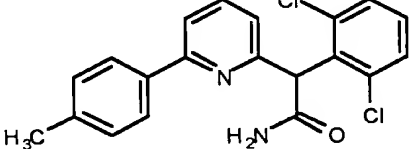
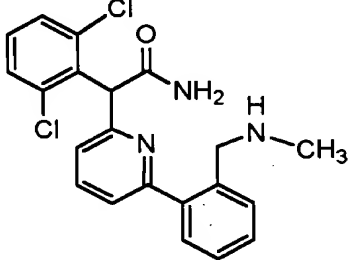
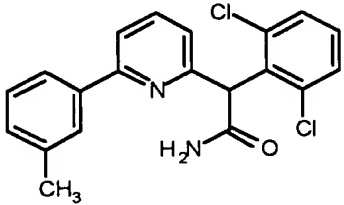
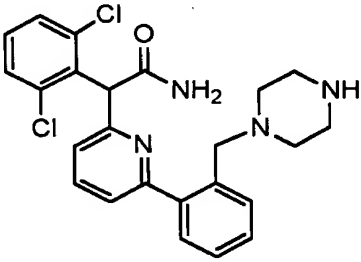
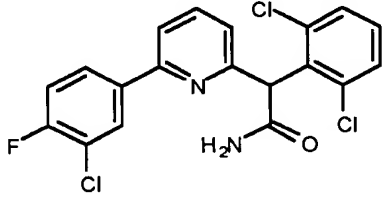
cpd #	Structure	cpd #	Structure
[203]		[207]	
[204]		208	
[205]		209	

23. (Twice amended) The compound according to claim [38] 39, wherein said compound is a compound of formula Ig:

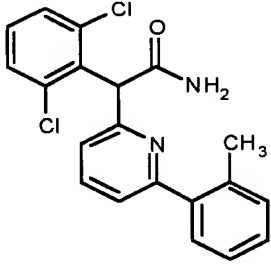
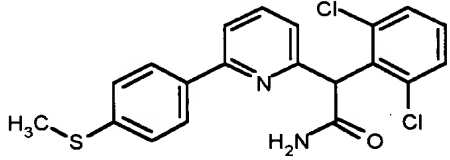
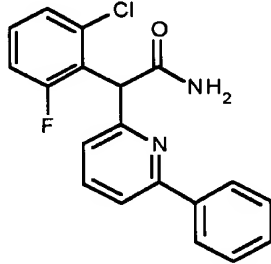
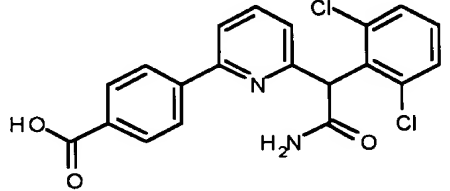
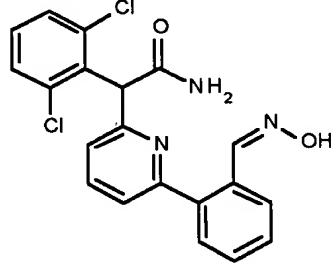
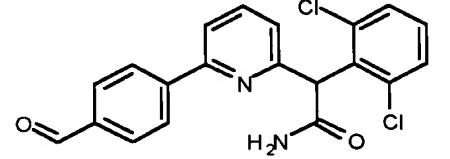
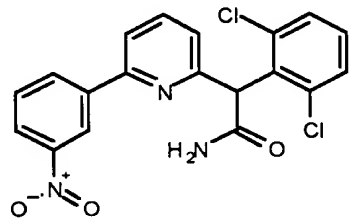
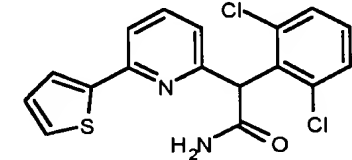
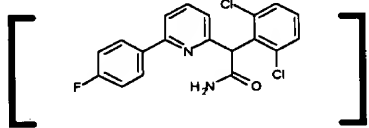
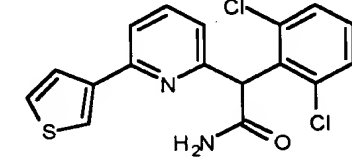


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and is selected from any one of the following compounds:

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302		311	
303		312	
304		313	

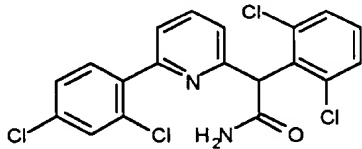
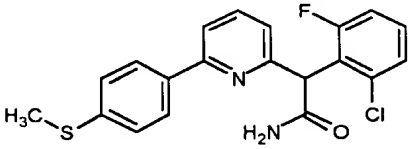
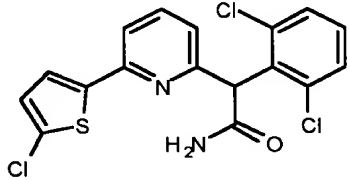
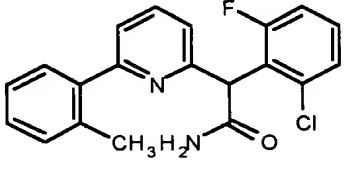
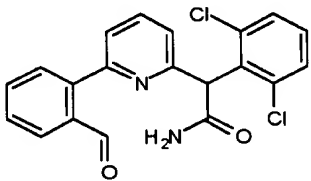
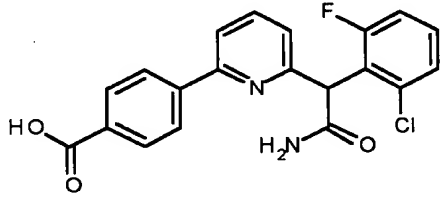
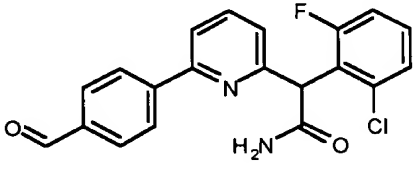
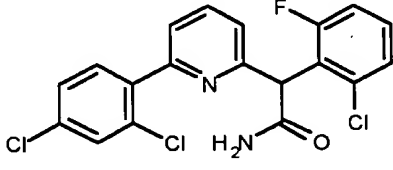
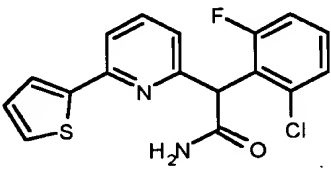
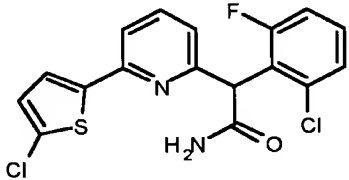
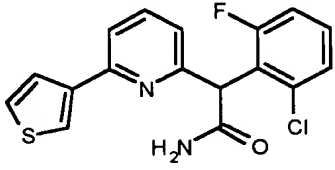
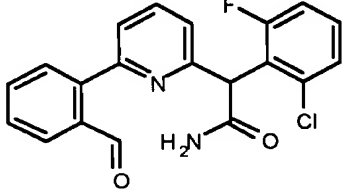
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306		315	
307		316	
308		317	
[309]		318	

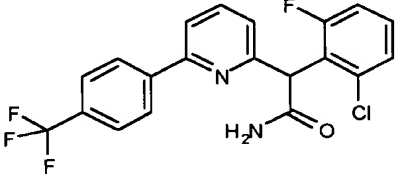
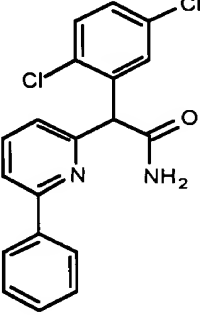
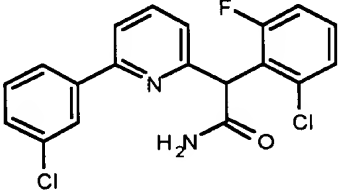
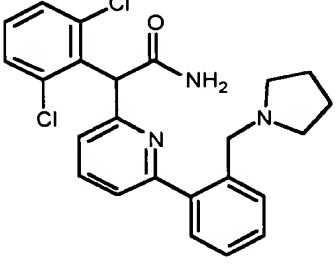
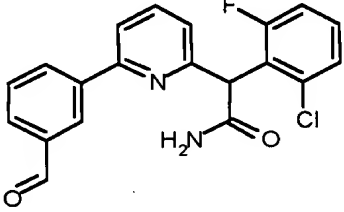
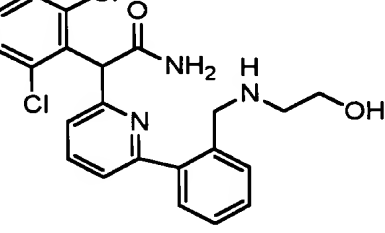
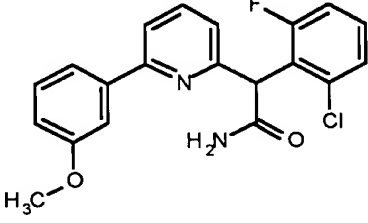
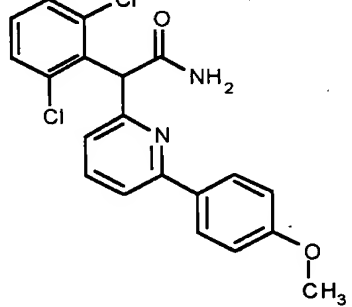
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321		330	
322		331	
323		332	
324		333	

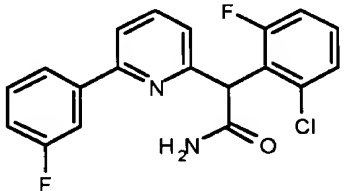
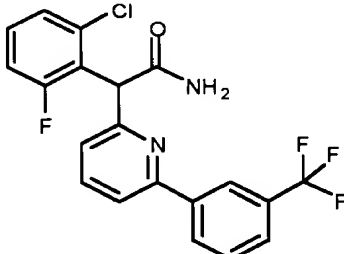
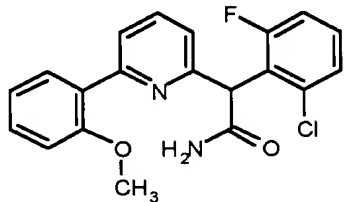
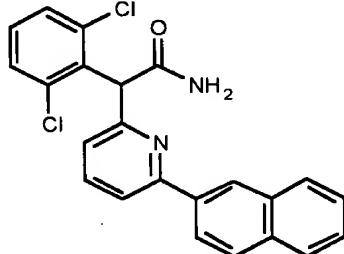
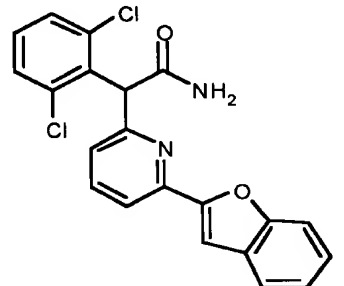
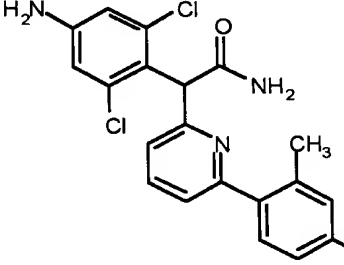
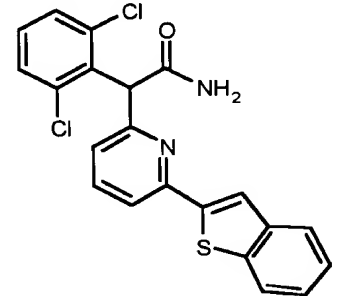
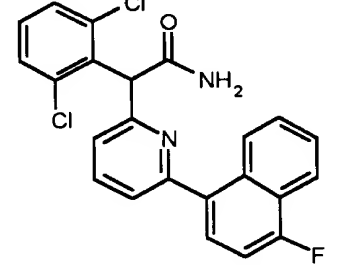
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327		336	
337		346	
338		347	
339		348	

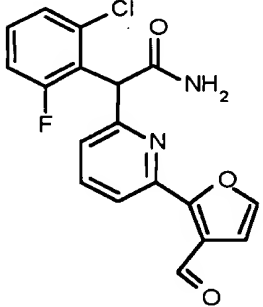
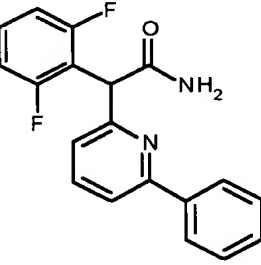
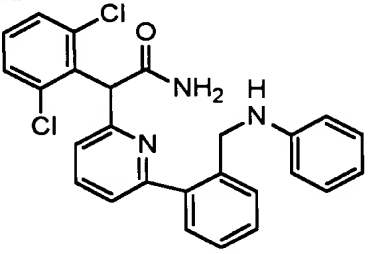
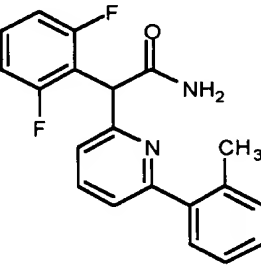
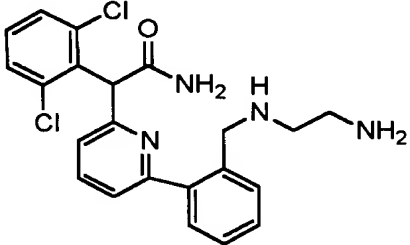
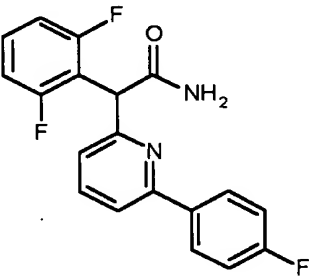
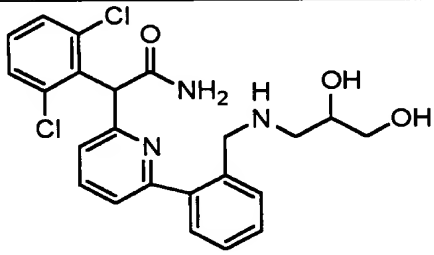
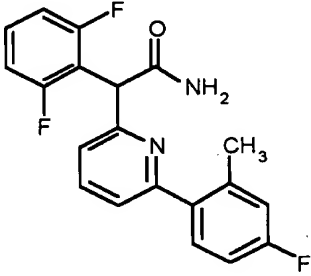
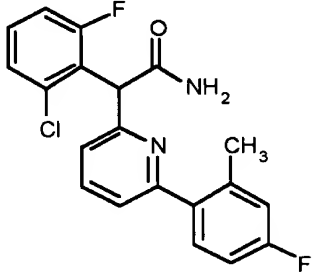
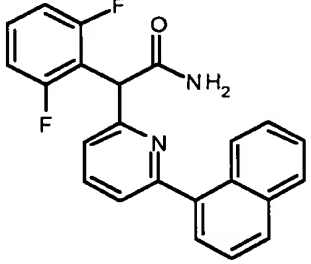
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343		352	

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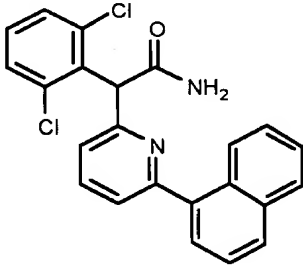
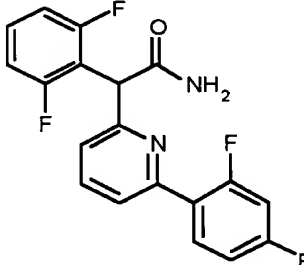
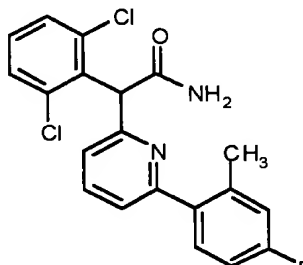
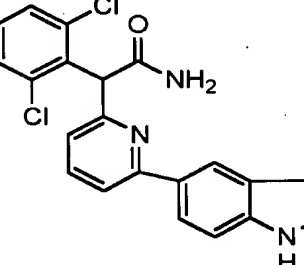
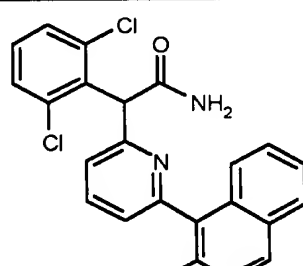
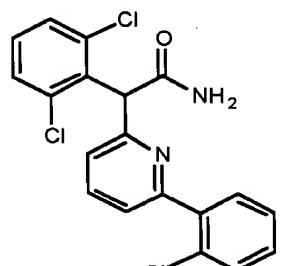
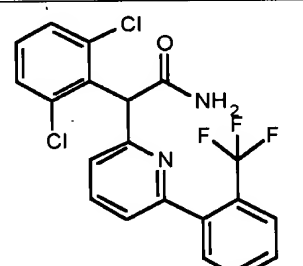
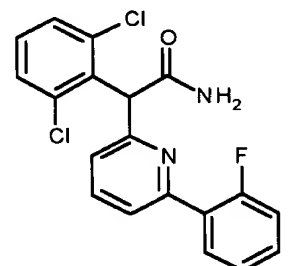
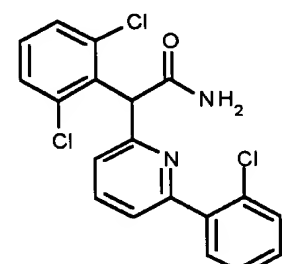
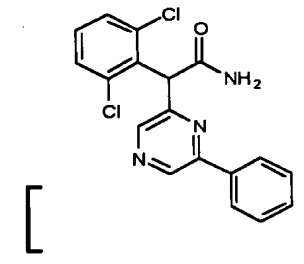
344		353	
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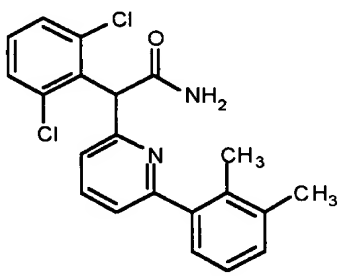
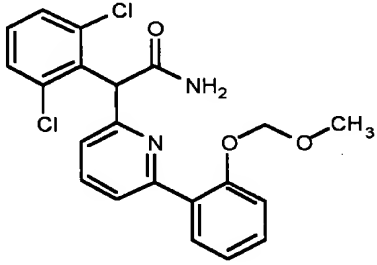
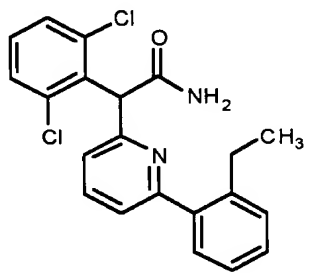
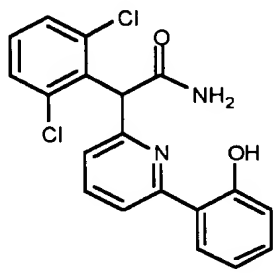
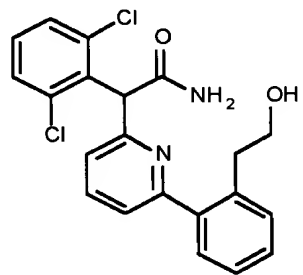
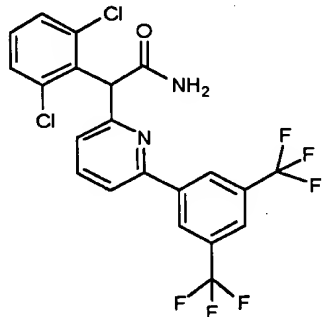
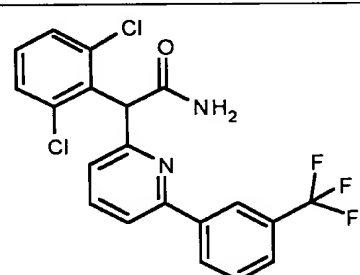
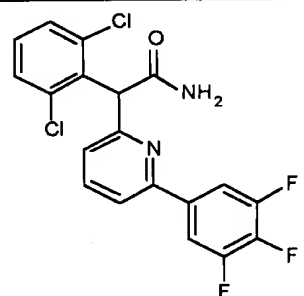
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361		370	

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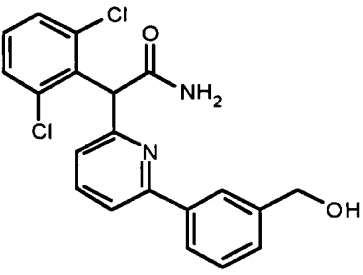
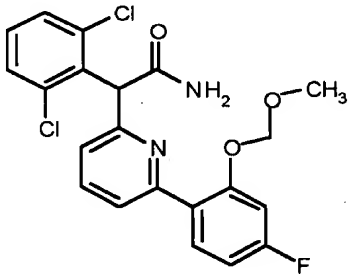
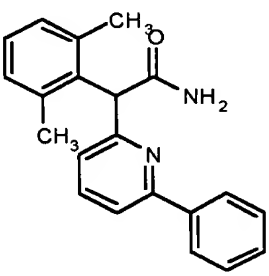
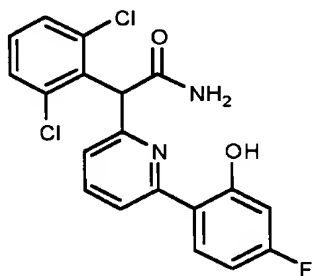
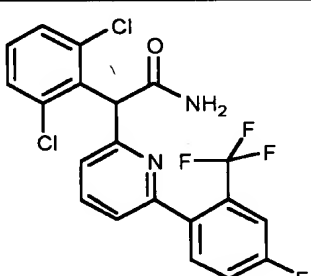
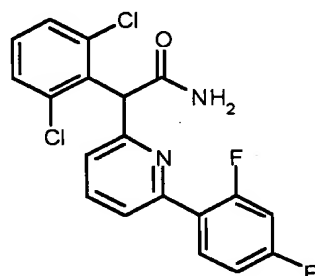
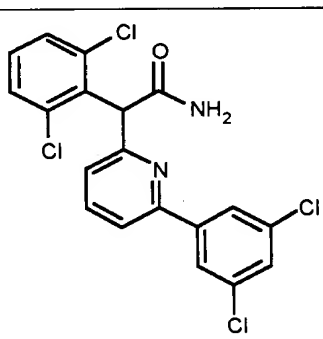
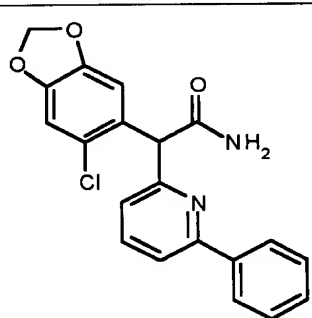
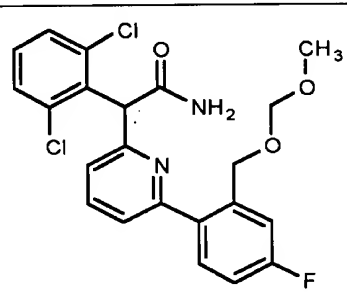
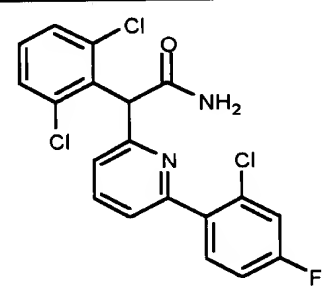


362		371	
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374		383	
375		[ 384 ]	

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376		385	
377		386	
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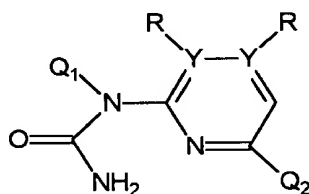
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380		389	
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391		396	
392		397	
393		398	

C

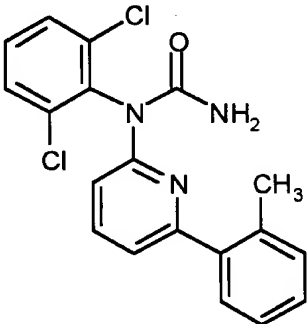
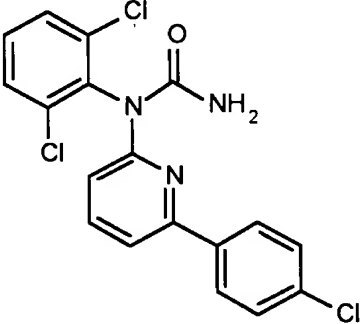
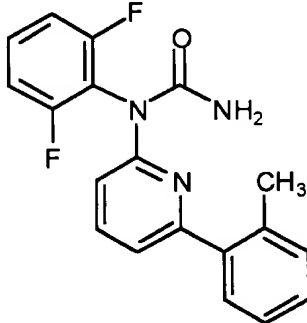
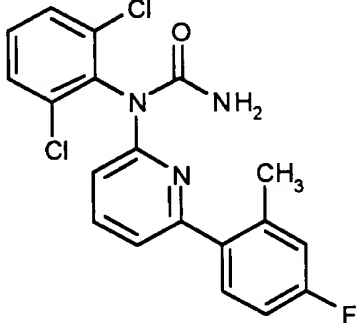
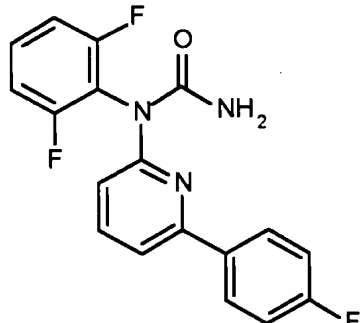
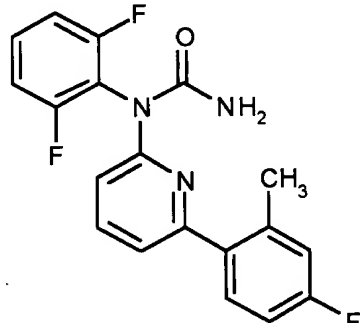
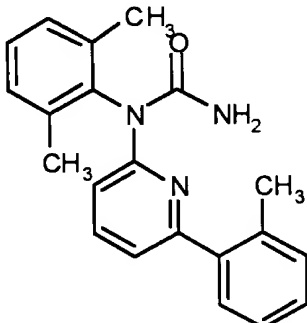
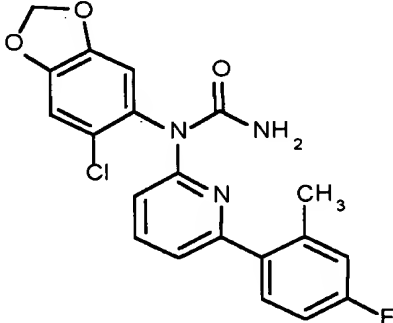
394		399	
395		1301	

24. (Thrice amended) The compound according to claim 38, wherein said compound is a compound of formula Ih:

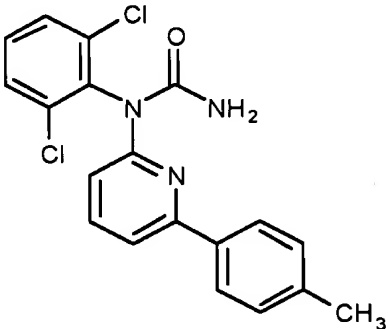
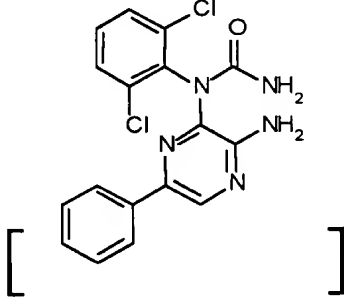


and is selected from any one of the following compounds:

cpd #	structure	Cpd #	structure
401		407	

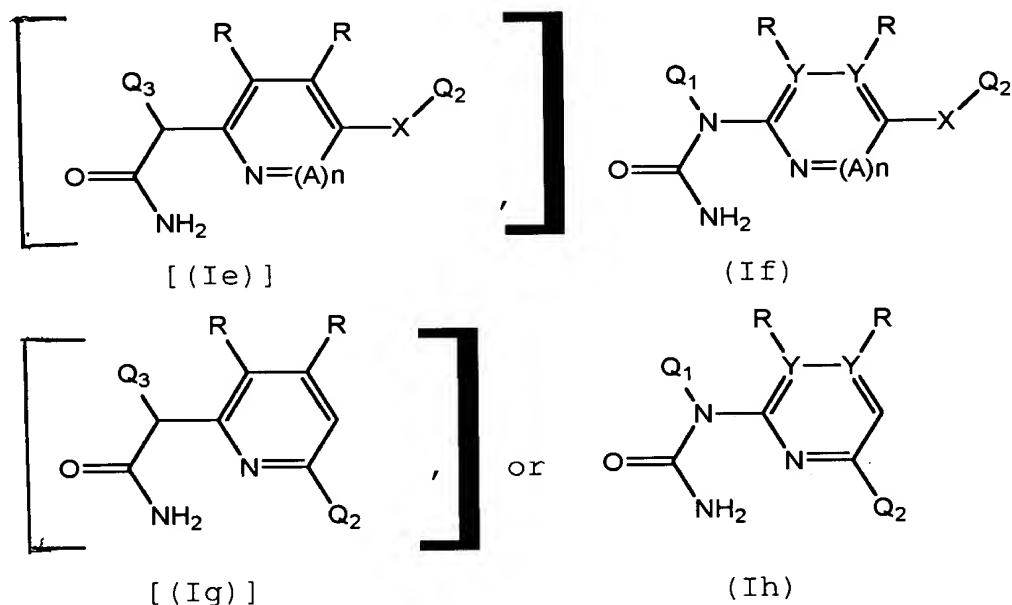
cpd #	structure	Cpd #	structure
402		408	
403		409	
404		410	
405		411	

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cpd #	structure	Cpd #	structure
406		[412]	

29. (Twice amended) The method according to claim 26, wherein said method is used to treat a destructive bone [disorders] disorder selected from osteoarthritis, osteoporosis or multiple myeloma-related bone disorder.

38. (Thrice Amended) A compound of the formula:



wherein:

[Q<sub>3</sub> is a 5-6 membered aromatic carbocyclic or heterocyclic ring system; or an 8-10 membered bicyclic ring system comprising aromatic carbocyclic rings, aromatic heterocyclic rings or a combination of an aromatic carbocyclic

C

ring and an aromatic heterocyclic ring; wherein  $Q_3$  is substituted with 1 to 4 substituents, each of which is independently selected from halo;  $C_1$ - $C_3$  alkyl optionally substituted with  $NR'_2$ ,  $OR'$ ,  $CO_2R'$  or  $CONR'_2$ ;  $O$ -( $C_1$ - $C_3$ )-alkyl optionally substituted with  $NR'_2$ ,  $OR'$ ,  $CO_2R'$  or  $CONR'_2$ ;  $NR'_2$ ;  $OCF_3$ ;  $CF_3$ ;  $NO_2$ ;  $CO_2R'$ ;  $CONHR'$ ;  $SR'$ ;  $S(O_2)N(R')_2$ ;  $SCF_3$ ;  $CN$ ;  $N(R')C(O)R^4$ ;  $N(R')C(O)OR^4$ ;  $N(R')C(O)C(O)R^4$ ;  $N(R')S(O_2)R^4$ ;  $N(R')R^4$ ;  $N(R^4)_2$ ;  $OR^4$ ;  $OC(O)R^4$ ;  $OP(O)_3H_2$ ; or  $N=CH-N(R')_2$ ; ]

each of  $Q_1$  and  $Q_2$  are independently selected from 5-6 membered aromatic carbocyclic or heterocyclic ring systems, or 8-10 membered bicyclic ring systems consisting of aromatic carbocyclic rings, aromatic heterocyclic rings or a combination of an aromatic carbocyclic ring and an aromatic heterocyclic ring; wherein:

$Q_1$  is substituted with 1 to 4 substituents, independently selected from halo;  $C_1$ - $C_3$  alkyl optionally substituted with  $NR'_2$ ,  $OR'$ ,  $CO_2R'$  or  $CONR'_2$ ;  $O$ -( $C_1$ - $C_3$ )-alkyl optionally substituted with  $NR'_2$ ,  $OR'$ ,  $CO_2R'$  or  $CONR'_2$ ;  $NR'_2$ ;  $OCF_3$ ;  $CF_3$ ;  $NO_2$ ;  $CO_2R'$ ;  $CONHR'$ ;  $SR'$ ;  $S(O_2)N(R')_2$ ;  $SCF_3$ ;  $CN$ ;  $N(R')C(O)R^4$ ;  $N(R')C(O)OR^4$ ;  $N(R')C(O)C(O)R^4$ ;  $N(R')S(O_2)R^4$ ;  $N(R')R^4$ ;  $N(R^4)_2$ ;  $OR^4$ ;  $OC(O)R^4$ ;  $OP(O)_3H_2$ ; or  $N=CH-N(R')_2$ ; and

$Q_2$  is optionally substituted with up to 4 substituents, independently selected from halo,  $CH=N-OH$ , or  $CH=O$ ;  $C_1$ - $C_3$  straight or branched alkyl optionally substituted with  $NR'_2$ ,  $OR'$ ,  $CO_2R'$ ,  $S(O_2)N(R')_2$ ,  $N=CH-N(R')_2$ ,  $R^3$ ,  $NH-CH_3$ ,  $NHCH_2CH_2OH$ ,  $NHCH_2CH(OH)CH_2OH$ ,  $CH_2OCH_2OCH_3$ ,  $NHCH_2CH_2NH_2$ ,  $NH$ -phenyl, piperazinyl, pyrrolidinyl or  $CONR'_2$ ;  $O$ -( $C_1$ - $C_3$ )-alkyl optionally substituted with  $NR'_2$ ,  $OR'$ ,  $CO_2R'$ ,  $S(O_2)N(R')_2$ ,  $N=CH-N(R')_2$ ,  $R^3$ , or  $CONR'_2$ ;  $NR'_2$ ;  $OCF_3$ ;  $CF_3$ ;  $NO_2$ ;  $CO_2R'$ ;  $CONHR'$ ;  $R^3$ ;  $OR^3$ ;  $NHR^3$ ;  $SR^3$ ;  $C(O)R^3$ ;  $C(O)N(R')R^3$ ;  $C(O)OR^3$ ;  $SR'$ ;  $S(O_2)N(R')_2$ ;  $SCF_3$ ;  $N=CH-N(R')_2$ ;  $CH=N-OH$ ;  $CH=O$ ; or  $CN$ ;

wherein  $R'$  is selected from hydrogen, ( $C_1$ - $C_3$ )-alkyl; ( $C_2$ - $C_3$ )-alkenyl or alkynyl; phenyl or phenyl substituted with 1 to

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3 substituents independently selected from halo, methoxy, cyano, nitro, amino, hydroxy, methyl or ethyl;

$R^3$  is selected from a 5-6 membered aromatic carbocyclic or heterocyclic ring system; [and]

$R^4$  is  $(C_1-C_4)$ -alkyl optionally substituted with  $N(R')_2$ ,  $OR'$ ,  $CO_2R'$ ,  $CON(R')_2$ , or  $SO_2N(R^2)_2$ ; or a 5-6 membered carbocyclic or heterocyclic ring system optionally substituted with  $N(R')_2$ ,  $OR'$ ,  $CO_2R'$ ,  $CON(R')_2$ , or  $SO_2N(R^2)_2$ ;

X is selected from  $-S-$ ,  $-O-$ ,  $-S(O_2)-$ ,  $-S(O)-$ ,  $-S(O_2)-$ ,  $N(R^2)-$ ,  $-N(R^2)-S(O_2)-$ ,  $-N(R^2)-C(O)O-$ ,  $-O-C(O)-N(R^2)$ ,  $-C(O)-$ ,  $-C(O)O-$ ,  $-O-C(O)-$ ,  $-C(O)-N(R^2)-$ ,  $-N(R^2)-C(O)-$ ,  $-N(R^2)-$ ,  $-C(R^2)_2-$ ,  $-C(OR^2)_2-$ ,  $-CH(OH)-$ ;

each R is independently selected from hydrogen,  $-R^2$ ,  $-N(R^2)_2$ ,  $-OR^2$ ,  $SR^2$ ,  $-C(O)-N(R^2)_2$ ,  $-S(O_2)-N(R^2)_2$ , or  $-C(O)-OR^2$ , wherein two adjacent R are optionally bound to one another and, together with each Y to which they are respectively bound, form a 4-8 membered carbocyclic or heterocyclic ring;

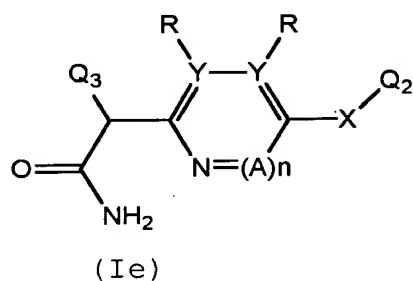
$R^2$  is selected from hydrogen,  $(C_1-C_3)$ -alkyl, or  $(C_1-C_3)$ -alkenyl; each optionally substituted with  $-N(R')_2$ ,  $-OR'$ ,  $SR'$ ,  $-C(O)-N(R')_2$ ,  $-S(O_2)-N(R')_2$ ,  $-C(O)-OR'$ , or  $R^3$ ;

Y is C;

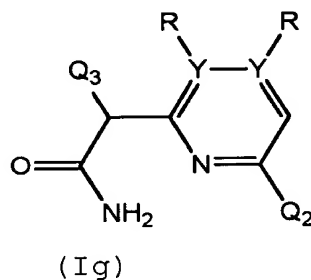
A is  $CR'$ ; and

n is 1; wherein an aromatic heterocyclic ring system comprises 1-2 heteroatoms independently selected from N, O or S.

39. (Added) A compound of the formula:



or





wherein:

Q<sub>3</sub> is a 5-6 membered aromatic carbocyclic or heterocyclic ring system; or an 8-10 membered bicyclic ring system comprising aromatic carbocyclic rings, aromatic heterocyclic rings or a combination of an aromatic carbocyclic ring and an aromatic heterocyclic ring; wherein Q<sub>3</sub> is substituted with 1 to 4 substituents, each of which is independently selected from halo; C<sub>1</sub>-C<sub>3</sub> alkyl optionally substituted with NR'<sub>2</sub>, OR', CO<sub>2</sub>R' or CONR'<sub>2</sub>; O-(C<sub>1</sub>-C<sub>3</sub>)-alkyl optionally substituted with NR'<sub>2</sub>, OR', CO<sub>2</sub>R' or CONR'<sub>2</sub>; NR'<sub>2</sub>; OCF<sub>3</sub>; CF<sub>3</sub>; NO<sub>2</sub>; CO<sub>2</sub>R'; CONHR'; SR'; S(O<sub>2</sub>)N(R')<sub>2</sub>; SCF<sub>3</sub>; CN; N(R')C(O)R<sup>4</sup>; N(R')C(O)OR<sup>4</sup>; N(R')C(O)C(O)R<sup>4</sup>; N(R')S(O<sub>2</sub>)R<sup>4</sup>; N(R')R<sup>4</sup>; N(R<sup>4</sup>)<sub>2</sub>; OR<sup>4</sup>; OC(O)R<sup>4</sup>; OP(O)<sub>3</sub>H<sub>2</sub>; or N=CH-N(R')<sub>2</sub>;

Q<sub>2</sub> is selected from 5-6 membered aromatic carbocyclic or heterocyclic ring systems, or 8-10 membered bicyclic ring systems consisting of aromatic carbocyclic rings, aromatic heterocyclic rings or a combination of an aromatic carbocyclic ring and an aromatic heterocyclic ring; wherein:

Q<sub>2</sub> is optionally substituted with up to 4 substituents, independently selected from halo, CH=N-OH, or CH=O; C<sub>1</sub>-C<sub>3</sub> straight or branched alkyl optionally substituted with NR'<sub>2</sub>, OR', CO<sub>2</sub>R', S(O<sub>2</sub>)N(R')<sub>2</sub>, N=CH-N(R')<sub>2</sub>, R<sup>3</sup>, NH-CH<sub>3</sub>, NHCH<sub>2</sub>CH<sub>2</sub>OH, NHCH<sub>2</sub>CH(OH)CH<sub>2</sub>OH, CH<sub>2</sub>OCH<sub>2</sub>OCH<sub>3</sub>, NHCH<sub>2</sub>CH<sub>2</sub>NH<sub>2</sub>, NH-phenyl, piperazinyl, pyrrolidinyl or CONR'<sub>2</sub>; O-(C<sub>1</sub>-C<sub>3</sub>)-alkyl optionally substituted with NR'<sub>2</sub>, OR', CO<sub>2</sub>R', S(O<sub>2</sub>)N(R')<sub>2</sub>, N=CH-N(R')<sub>2</sub>, R<sup>3</sup>, or CONR'<sub>2</sub>; NR'<sub>2</sub>; OCF<sub>3</sub>; CF<sub>3</sub>; NO<sub>2</sub>; CO<sub>2</sub>R'; CONHR'; R<sup>3</sup>; OR<sup>3</sup>; NHR<sup>3</sup>; SR<sup>3</sup>; C(O)R<sup>3</sup>; C(O)N(R')R<sup>3</sup>; C(O)OR<sup>3</sup>; SR'; S(O<sub>2</sub>)N(R')<sub>2</sub>; SCF<sub>3</sub>; N=CH-N(R')<sub>2</sub>; CH=N-OH; CH=O; or CN;

wherein R' is selected from hydrogen, (C<sub>1</sub>-C<sub>3</sub>)-alkyl; (C<sub>2</sub>-C<sub>3</sub>)-alkenyl or alkynyl; phenyl or phenyl substituted with 1 to 3 substituents independently selected from halo, methoxy, cyano, nitro, amino, hydroxy, methyl or ethyl;

R<sup>3</sup> is selected from a 5-6 membered aromatic carbocyclic or heterocyclic ring system;

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$R^4$  is  $(C_1-C_4)$ -alkyl optionally substituted with  $N(R')_2$ ,  $OR'$ ,  $CO_2R'$ ,  $CON(R')_2$ , or  $SO_2N(R^2)_2$ ; or a 5-6 membered carbocyclic or heterocyclic ring system optionally substituted with  $N(R')_2$ ,  $OR'$ ,  $CO_2R'$ ,  $CON(R')_2$ , or  $SO_2N(R^2)_2$ ;

X is selected from  $-S-$ ,  $-O-$ ,  $-S(O_2)-$ ,  $-S(O)-$ ,  $-S(O_2)-$ ,  $N(R^2)-$ ,  $-N(R^2)-S(O_2)-$ ,  $-N(R^2)-C(O)O-$ ,  $-O-C(O)-N(R^2)$ ,  $-C(O)-$ ,  $-C(O)O-$ ,  $-O-C(O)-$ ,  $-C(O)-N(R^2)-$ ,  $-N(R^2)-C(O)-$ ,  $-N(R^2)-$ ,  $-C(R^2)_2-$ ,  $-C(OR^2)_2-$ ,  $-CH(OH)-$ ;

each R is independently selected from hydrogen,  $-R^2$ ,  $-N(R^2)_2$ ,  $-OR^2$ ,  $SR^2$ ,  $-C(O)-N(R^2)_2$ ,  $-S(O_2)-N(R^2)_2$ , or  $-C(O)-OR^2$ , wherein two adjacent R are optionally bound to one another and, together with each carbon to which they are respectively bound, form a 4-8 membered carbocyclic or heterocyclic ring;

$R^2$  is selected from hydrogen,  $(C_1-C_3)$ -alkyl, or  $(C_1-C_3)$ -alkenyl; each optionally substituted with  $-N(R')_2$ ,  $-OR'$ ,  $SR'$ ,  $-C(O)-N(R')_2$ ,  $-S(O_2)-N(R')_2$ ,  $-C(O)-OR'$ , or  $R^3$ ;

Y is C;

A is  $CR'$ ; and

n is 1; wherein an aromatic heterocyclic ring system comprises 1-2 heteroatoms independently selected from N, O or S;

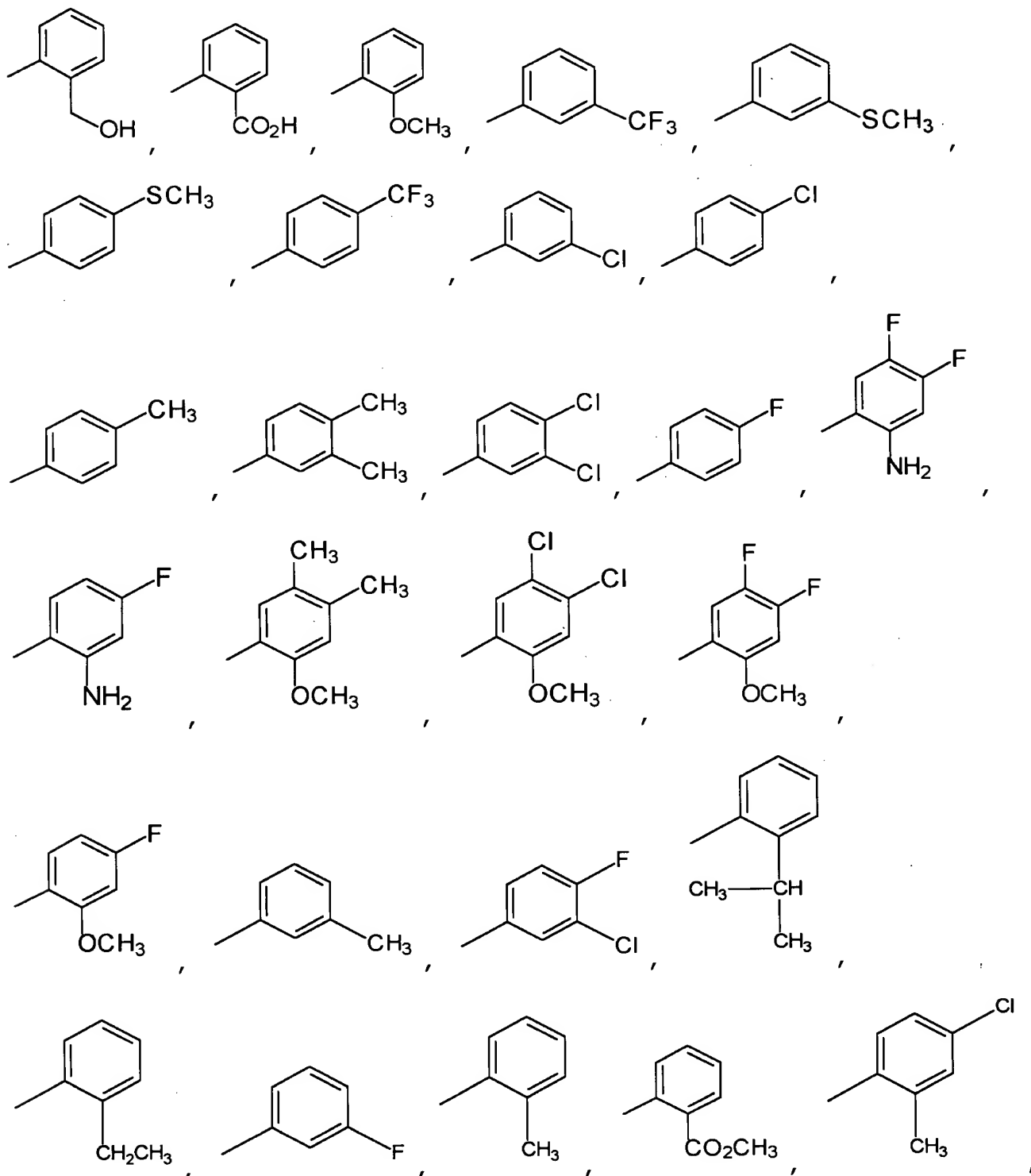
provided that for a compound of formula Ig, when  $Q_3$  is 2,6-dichlorophenyl and both R substituents are H, then  $Q_2$  is neither phenyl nor p-fluorophenyl; and

for a compound of formula Ie, when  $Q_3$  is 2,6-dichlorophenyl, both R substituents are H, and X is S, then  $Q_2$  is not phenyl.

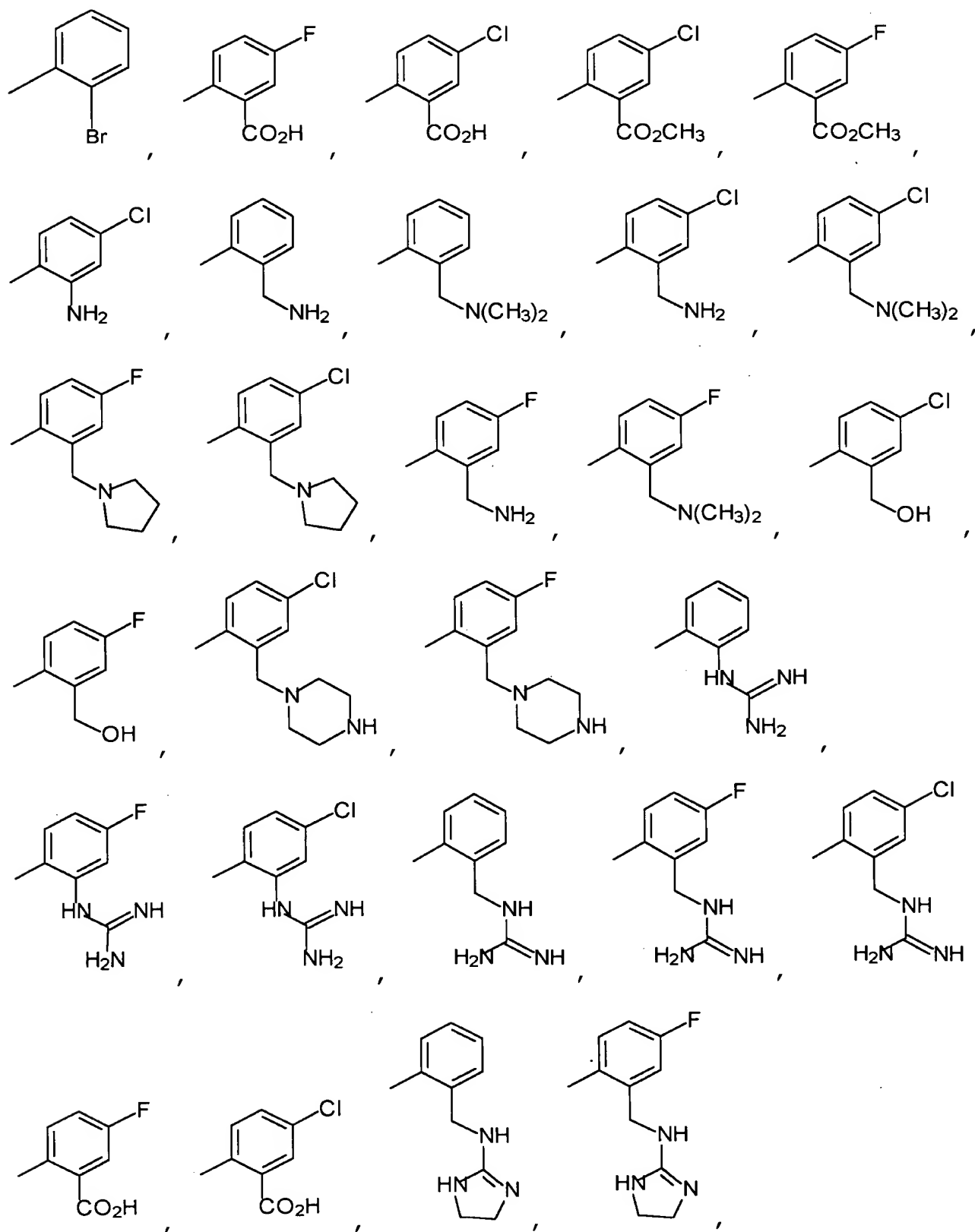
40. (Added) The compound according to claim 39, wherein  $Q_2$  is selected from phenyl or pyridyl and wherein  $Q_2$  optionally contains up to 3 substituents, each of which is independently selected from chloro, fluoro, bromo, methyl, ethyl, isopropyl,  $-OCH_3$ ,  $-OH$ ,  $-NH_2$ ,  $-CF_3$ ,  $-OCF_3$ ,  $-SCH_3$ ,  $-OCH_3$ ,  $-C(O)OH$ ,  $-C(O)OCH_3$ ,  $-CH_2NH_2$ ,  $-N(CH_3)_2$ ,  $-CH_2$ -pyrrolidine and  $-CH_2OH$ .

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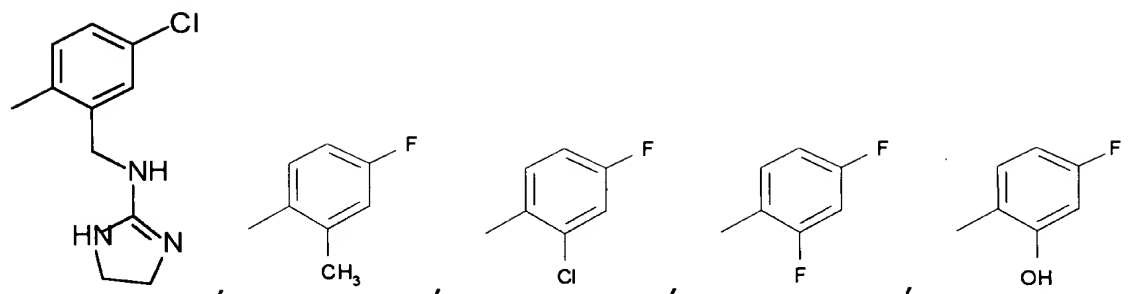
41. (Added) The compound according to claim 40,  
wherein, Q<sub>2</sub> is selected from:



C



C



unsubstituted 2-pyridyl or unsubstituted phenyl.

42. (Added) The compound according to claim 41, wherein  $Q_2$  is selected from phenyl, 2-isopropylphenyl, 3,4-dimethylphenyl, 2-ethylphenyl, 3-fluorophenyl, 2-methylphenyl, 3-chloro-4-fluorophenyl, 3-chlorophenyl, 2-carbomethoxyphenyl, 2-carboxyphenyl, 2-methyl-4-chlorophenyl, 2-bromophenyl, 2-pyridyl, 2-methylenedihydroxyphenyl, 4-fluorophenyl, 2-methyl-4-fluorophenyl, 2-chloro-4-fluorophenyl, 2,4-difluorophenyl, 2-hydroxy-4-fluorophenyl or 2-methylenedihydroxy-4-fluorophenyl.

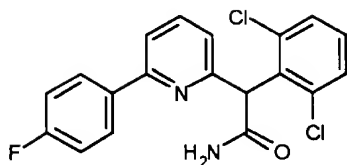
43. (Added) The compound according to claim 39, wherein X is selected from -S-, -O-, -S(O<sub>2</sub>)-, -S(O)-, -NR<sup>2</sup>-, -C(R<sup>2</sup>)<sub>2</sub>- or -C(O)-.

44. (Added) The compound according to claim 42, wherein X is S.

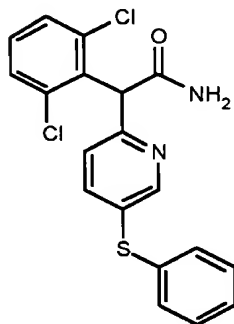
45. (Added) The compound according to claim 39, wherein each R attached to Y is independently selected from hydrogen or methyl.

46. (Added) A compound of the formula

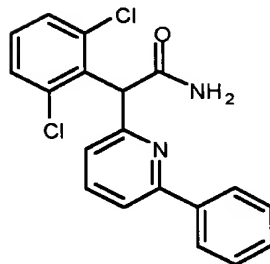
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47. (Added) A compound of the formula



48. (Added) A compound of the formula



49. (Added) A pharmaceutical composition comprising an amount of a compound according to claim 39 effective to inhibit p38, and a pharmaceutically acceptable carrier.

50. (Added) A method of treating inflammatory diseases, autoimmune diseases, viral diseases, destructive bone disorders, proliferative disorders, infectious diseases, neurodegenerative diseases, reperfusion/ischemia in stroke, myocardial ischemia, renal ischemia, heart attacks, angiogenic disorders, organ hypoxia, vascular hyperplasia, cardiac

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hypertrophy, thrombin-induced platelet aggregation or conditions associated with prostaglandin endoperoxide synthase-2 in a patient, said method comprising administering to said patient a composition according to claim 49.

51. (Added) The method according to claim 50, wherein said method is used to treat an inflammatory disease selected from acute pancreatitis, chronic pancreatitis, asthma, allergies, or adult respiratory distress syndrome.

52. (Added) The method according to claim 50, wherein said method is used to treat an autoimmune disease selected from glomerulonephritis, rheumatoid arthritis, systemic lupus erythematosus, scleroderma, chronic thyroiditis, Graves' disease, autoimmune gastritis, diabetes, autoimmune hemolytic anemia, autoimmune neutropenia, thrombocytopenia, atopic dermatitis, chronic active hepatitis, myasthenia gravis, multiple sclerosis, inflammatory bowel disease, ulcerative colitis, Crohn's disease, psoriasis, or graft vs. host disease.

53. (Added) The method according to claim 50, wherein said method is used to treat a destructive bone disorder selected from osteoarthritis, osteoporosis or multiple myeloma-related bone disorder.

54. (Added) The method according to claim 50, wherein said method is used to treat a proliferative disease selected from acute myelogenous leukemia, chronic myelogenous leukemia, metastatic melanoma, Kaposi's sarcoma, or multiple myeloma.

55. (Added) The method according to claim 50, wherein said method is used to treat an infectious disease selected from sepsis, septic shock, or Shigellosis.

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56. (Added) The method according to claim 50, wherein said method is used to treat a viral disease selected from acute hepatitis infection, HIV infection or CMV retinitis.

57. (Added) The method according to claim 50, wherein said method is used to treat a neurodegenerative disease selected from Alzheimer's disease, Parkinson's disease, cerebral ischemia or neurodegenerative disease caused by traumatic injury.

58. (Added) The method according to claim 50, wherein said method is used to treat ischemia/reperfusion in stroke or myocardial ischemia, renal ischemia, heart attacks, organ hypoxia or thrombin-induced platelet aggregation.

59. (Added) The method according to claim 50, wherein said method is used to treat a condition associated with prostaglandin endoperoxide synthase-2 selected from edema, fever, analgesia or pain.

60. (Added) The method according to claim 59, wherein said pain is selected from neuromuscular pain, headache, cancer pain, dental pain or arthritis pain.

61. (Added) The method according to claim 50, wherein said method is used to treat an angiogenic disorder selected from solid tumors, ocular neovascularization, or infantile haemangiomas.

62. (Added) A pharmaceutical composition comprising an amount of a compound according to claim 46 effective to inhibit p38, and a pharmaceutically acceptable carrier.

63. (Added) A method of treating inflammatory

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diseases, autoimmune diseases, viral diseases, destructive bone disorders, proliferative disorders, infectious diseases, neurodegenerative diseases, reperfusion/ischemia in stroke, myocardial ischemia, renal ischemia, heart attacks, angiogenic disorders, organ hypoxia, vascular hyperplasia, cardiac hypertrophy, thrombin-induced platelet aggregation or conditions associated with prostaglandin endoperoxide synthase-2 in a patient, said method comprising administering to said patient a composition according to claim 62.

64. (Added) A pharmaceutical composition comprising an amount of a compound according to claim 47 effective to inhibit p38, and a pharmaceutically acceptable carrier.

65. (Added) A method of treating inflammatory diseases, autoimmune diseases, viral diseases, destructive bone disorders, proliferative disorders, infectious diseases, neurodegenerative diseases, reperfusion/ischemia in stroke, myocardial ischemia, renal ischemia, heart attacks, angiogenic disorders, organ hypoxia, vascular hyperplasia, cardiac hypertrophy, thrombin-induced platelet aggregation or conditions associated with prostaglandin endoperoxide synthase-2 in a patient, said method comprising administering to said patient a composition according to claim 64.

66. (Added) A pharmaceutical composition comprising an amount of a compound according to claim 48 effective to inhibit p38, and a pharmaceutically acceptable carrier.

67. (Added) A method of treating inflammatory diseases, autoimmune diseases, viral diseases, destructive bone disorders, proliferative disorders, infectious diseases, neurodegenerative diseases, reperfusion/ischemia in stroke,

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myocardial ischemia, renal ischemia, heart attacks, angiogenic disorders, organ hypoxia, vascular hyperplasia, cardiac hypertrophy, thrombin-induced platelet aggregation or conditions associated with prostaglandin endoperoxide synthase-2 in a patient, said method comprising administering to said patient a composition according to claim 66.

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Appendix B

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IN THE MATTER OF THE APPLICATION OF ROBERT N. JOHNSON  
and ALFORD G. FARNHAM

Patent Appeal No. 76-643

UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

558 F.2d 1008; 1977 CCPA LEXIS 140; 194 U.S.P.Q. (BNA) 187

June 16, 1977, Decided

**PRIOR HISTORY:**

[\*\*1]

Serial No. 230,091

*n1* Claims 10-54 and 65-67 stand allowed.  
A petition for reconsideration was denied by  
the board.

**COUNSEL:**

Robert C. Brown, New York City, Aldo J. Cozzi,  
Union City, N.J., attorneys of record, for appellants;  
James C. Arvantes, Arlington, Va., of counsel.

Joseph F. Nakamura, Washington, D.C., for the  
Commissioner of Patents; Henry W. Tarring, II,  
Washington, D.C., of counsel.

**OPINION BY:**

MARKEY

**OPINION:**

[\*1009]

MARKEY, Chief Judge.

This appeal is from the decision of the Patent and Trademark Office (PTO) Board of Appeals affirming the rejection under 35 USC 102 or 103 (the rejection also raises a written description issue under 35 USC 112, first paragraph) of claims 1-9, 64, and 68-70 and the rejection under 35 USC 112, first paragraph (enablement) and second paragraph (indefiniteness), of claims 64 and 68-72 in appellants' application No. 230,091 filed February 28, 1972 (the 1972 application) for "Polyarylene Polyethers." *n1* The 1972 application is a continuation-in-part of three earlier applications, the earliest being application No. 295,519 filed July 16, 1963 (the 1963 application). We reverse.

[\*\*2]

*The Invention*

The invention is in the field of polymer chemistry and more specifically relates to linear thermoplastic polyarylene polyether polymers composed of recurring units having the general formula (- O-E-O-E' -) where O represents an oxygen atom, *n2* E represents the residuum of a dihydric phenol *n3* compound, and E' represents the [\*1010] residuum of a benzenoid compound having one or more inert electron withdrawing groups *n4* in the ortho *n5* or para *n6* positions to the valence bonds and where both E and E' are bonded to the ether oxygens through aromatic carbon atoms.

*n2* The - O - linkages in the general formula are called ether linkages.

Footnotes-----

*n3* A dihydric phenol is a type of aromatic organic compound in which two hydroxy (-OH) groups are attached directly to a benzene ring.

Footnotes-----

*n4* An electron withdrawing group is a substituent which withdraws electrons from the aromatic ring to which it is attached.

[\*\*3]

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*n5* An aromatic ring bearing substituents on adjacent carbon atoms is called ortho substituted.

*n6* An aromatic ring bearing substituents on opposite carbon atoms is called para substituted.

Appellants describe a method of synthesizing these polymers by reacting a double alkali metal salt of a dihydric phenol with a dihalobenzenoid compound in the presence of certain solvents under substantially anhydrous reaction conditions.

The 1972 application includes the following disclosure with respect to the electron withdrawing group found in E' and in the E' precursor compound, that is, in the compound which is the predecessor of E' in the above general formula (we have designated paragraphs [A] and [B] and have added emphasis thereto):

Any electron withdrawing group can be employed as the activator group in these [\*\*4] compounds. It should be, of course, inert to the reaction, but otherwise its structure is not critical. Preferred are the strong activating groups such as the sulfone group (-O=S=O-) bonding two halogen substituted benzenoid nuclei as in the 4,4'-dichlorodiphenyl sulfone and 4,4'-difluorodiphenyl sulfone, although such other strong withdrawing groups hereinafter mentioned can also be used with equal ease.

The more powerful of the electron withdrawing groups give the fastest reactions and hence are preferred. It is further preferred that the ring contain no electron supplying groups on the same benzenoid nucleus as the halogen; however, the presence of other groups on the nucleus or in the residuum of the compound can be tolerated. Preferably, all of the substituents on the benzenoid nucleus are either hydrogen (zero electron withdrawing), or other groups having a positive sigma \* value, as set forth in J. F. Bunnett in Chem. Rev. 49 273 (1951) and Quart. Rev., 12, 1 (1958). See also Taft, *Steric Effects in Organic Chemistry*, John Wiley & Sons (1956), chapter 13; Chem. Rev., 53, 222; JACS, 74, 3120; and JACS, 75, 4231. *n7*

*n7* / Appellants' brief specifically refers to one of the publications cited (Chem. Rev., 53, 222 [1953]) and states that its author (Jaffe) defines the sigma \* value as a "special substituent constant" for the "Hammett

equation" which is an empirically derived formula intended to show a general quantitative relation between the nature of a given substituent and the reactivity of a side chain. Thus, sigma \* values are based on experimental data and they measure the "activation energy" of a given substituent (electron withdrawing group).

[\*\*5]

The electron withdrawing group of the dihalobenzenoid compound can function either through the resonance of the aromatic ring, as indicated by those groups having a high sigma \* value, i.e., above about +0.7 or by induction as in perfluoro compounds and like electron sinks.

[A]

*Preferably the activating group should have a high sigma \* value, preferably above 1.0, although sufficient activity to promote the reaction is evidenced in those groups having a sigma value above 0.7, although the reaction rate with such a low powered electron withdrawing group may be somewhat low.*

The activating group can be basically either of two types:

(a) monovalent groups that activate one or more halogens on the same ring as a nitro group, phenylsulfone, or alkylsulfone, cyano, trifluoromethyl, nitroso, and hetero nitrogen as in pyridine. [\*1011]

(b) divalent group [sic] which can activate displacement of halogens on two different rings, such as the sulfone group -O=S=O-; the carbonyl group -O=C-; the vinyl group -H-C=C-H-; the sulfoxide group -O=S-; the azogroup -N=N-; the saturate fluorocarbon groups -CF<sub>2</sub>CF<sub>2</sub>-; organic phosphine oxides -O=P=R-; where R is a hydrocarbon group, [\*\*6] and the ethylidene group -X-C-X=C- where X can be hydrogen or halogen or which can activate halogens on the same ring such as with difluorobenzoquinone, 1,4- or 1,5- or 1,8-difluoroanthraquinone.

[B]

*Those skilled in the art will understand that a plurality of electron withdrawing groups may be employed if desired, including electron withdrawing groups having a sigma \* value below about +0.7 provided the cumulative sigma \* influence on each of the reactive halogen groups of the halobenzenoid compound is at least about +0.7.*

*The Disclosure and Prosecution History of the 1963 Application*

To understand the written description issue in this appeal, it is necessary to summarize the disclosure and prosecution history of the 1963 application. The 1963 application described (and claimed) in haec verba a

genus of polymers as defined by the above general formula. That application stated:

The high molecular weight polyarylene polyethers of the present invention are the linear thermoplastic reaction products of an alkali metal double salt of a dihydric phenol and a dihalobenzenoid compound. Characteristically, this polymer has a basic structure composed of recurring units [\*\*7] having the formula

-O-E-O-E'- and E' is the residuum of the benzenoid compound,

wherein E is the residuum of the dihydric phenol both of which are valently bonded to the ether oxygen through aromatic carbon atoms, as hereinafter more fully discussed. Polymers of this type exhibit excellent strength and toughness properties as well as outstanding thermal, oxidative and chemical stability.

The 1963 application then discussed the identity of E and the E precursor compound, that is, the compound which is the predecessor of E in the general formula. It stated:

The residuum E of the dihydric phenol of these alkali metal salts is not narrowly critical. It can be, for instance, a mononuclear phenylene group as results from hydroquinone and resorcinol, or it may be a di- or polynuclear residuum. Likewise it is possible that the residuum be substituted with other inert nuclear substituents such as halogen, alkyl, alkoxy and like inert substituents.

\*\*\*Such dinuclear phenols can be characterized as having the structure:



wherein Ar is an aromatic group and preferably is a phenylene group, Y and Y1 can be the same or different inert substituent [\*\*8] groups as alkyl groups having from 1 to 4 carbon atoms, halogen atoms, i.e. fluorine, chlorine, bromine or iodine, or alkoxy radicals having from 1 to 4 carbon atoms, r and z are integers having a value from 0 to 4, inclusive, and R is representative of a bond between aromatic carbon atoms as in dihydroxydiphenyl, or is a divalent radical, including for example, inorganic radicals as -O=C-, -O-, -S-, -S-S-, -SO2-, and divalent organic hydrocarbon radicals such as alkylene, alkylidene, cycloaliphatic, or the [\*1012] halogen, alkyl, aryl or like substituted alkylene, alkylidene and cycloaliphatic radicals as well as alkalicyclic, alkarylene and aromatic radicals and a ring fused to both Ar [groups].

The application then mentioned by name some fifty specific dihydric dinuclear phenol (bisphenol) compounds which could be the E precursor compound. The application further stated:

A preferred form of the polyarylene polyethers of this invention are those prepared using the dihydric polynuclear phenols of the following four types,

including the derivatives thereof which are substituted with inert substituent groups

[Graphic omitted. See illustration in original]

in which [\*\*9] the R group represents hydrogen, lower alkyl, lower aryl and the halogen substituted groups thereof, which can be the same or different.

[Graphic omitted. See illustration in original]

Turning to the identity of the E' precursor compound, the application stated:

Any dihalobenzenoid compound or mixture of dihalobenzenoid compounds can be employed in this invention which compound or compounds has the two halogens bonded to benzene rings having an electron withdrawing group in at least one of the positions ortho and para to the halogen group. The dihalobenzenoid compound can be either mononuclear where the halogens are attached to the same benzenoid ring or polynuclear where they are attached to different benzenoid rings, as long as there is the activating electron withdrawing group in the ortho or para position of that benzenoid nucleus.

The 1963 application also included a discussion of the electron withdrawing group that was substantially the same as the paragraphs quoted above from the 1972 application.

The 1963 application contained twenty-six "examples" disclosing in detail the physical and chemical characteristics of fifteen species of polyarylene polyethers. One [\*\*10] of the species was the polymer composed of these recurring structural units (which we designate as species [1]):  
n8/

[Graphic omitted. See illustration in original]

n8 / The -SO2- linking group in species [1] is called a sulfone group.

Another species disclosed was the polymer composed of these recurring structural units (which we designate as species [2]): n9/

[Graphic omitted. See illustration in original]

n9 / The -CO- linking group in species (2) is called a carbonyl group.

Appellants' 1963 application became involved in a three-party interference n10/ which resulted in an award of priority adverse to appellants from which

they did not appeal.<sup>n11/</sup> The sole count of the interference recited species [1].

<sup>n10 /</sup> Interference No. 95,807, declared February 17, 1967.

[\*\*11]

<sup>n11 /</sup> Another party did appeal. See *Vogel v. Jones*, 486 F.2d 1068, 179 USPQ 425 (CCPA 1973).

[\*1013]

After their involvement in the interference ended, appellants filed the 1972 application, and they sought broad claims which would at the same time exclude the subject matter of the lost count.

#### *The Claims*

Claim 1, now on appeal, is illustrative of the group of claims (claims 1-9, 64, and 68-70) which seek to exclude the subject matter of the lost count and which are involved in the 35 USC 102 or 103 rejection:

1. A substantially linear thermoplastic polyarylene polyether composed of recurring units having the general formula:



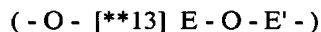
where E is the residuum of a dihydric phenol and E' is the residuum of a benzenoid compound having an inert electron withdrawing group in one or more of the positions ortho and para to the valence bonds having a sigma \* value above about +0.7, and where both of said residuum [sic, residua] are valently bonded to the ether oxygens [\*\*12] through aromatic carbon atoms with the provisos that E and E' may not both include a divalent sulfone group and may not both include a divalent carbonyl group linking two aromatic nuclei. [Emphasis added.]

The first "proviso" in claim 1, that "E and E' may not both include a divalent sulfone group," excludes species [1], the species of the lost count. The second "proviso," that "E and E' \*\*\* may not both include a divalent carbonyl group," excludes species [2], which appellants state is "analogous" or "equivalent" to species [1]. <sup>n12/</sup>

<sup>n12 /</sup> The provisos actually exclude more than species [1] and [2]. For example, polymers similar to species [1] and [2] but having substituted ring structures are also excluded.

Claims 64 and 71 are illustrative of the group of claims (claims 64 and 68-72) rejected under 35 USC 112, first and second paragraphs:

64. A substantially linear thermoplastic polyarylene polyether composed of recurring units having the general formula:



where E is the residuum of a dihydric phenol and E' is the residuum of a benzenoid compound having one or more inert electron withdrawing groups in at least one of the position [sic, positions] ortho and para to the valence bonds having a sigma \* value sufficient to activate a halogen atom and where both of said residuum [sic, residua] are valently bonded to the ether oxygens through aromatic carbon atoms with the provisos that E and E' may not both include a divalent carbonyl group linking two aromatic nuclei. [Emphasis added.]

71. The process for preparing substantially linear polyarylene polyethers which comprises reacting substantially equimolar amounts of an alkali metal double salt of a dihydric phenol with a dihalobenzenoid compound having halogen atoms activated by an inert electron withdrawing group in at least one of the positions ortho and para to the halogen atom, under substantially anhydrous conditions and in the liquid phase of an organic solvent having the formula:

R - SO Z - R in which R represents a member of the group consisting of monovalent lower hydrocarbon groups free of aliphatic unsaturation on the alpha carbon atom and, [\*\*14] when connected together represents a divalent alkylene group, and Z is an integer from 1 to 2 inclusive. [Emphasis added.]

#### *The Rejections*

The sole reference relied upon by the examiner and the board is:

Netherlands 6,408,130 January 18, 1965 [\*1014]

Claims 1-9, 64, and 68-70 were rejected under 35 USC 102 or 103 as unpatentable in view of the Netherlands patent, which is a foreign-filed counterpart of appellants' 1963 application.

Before the PTO, appellants conceded that the invention was fully disclosed in the Netherlands patent. However, appellants contended that the claims are entitled to the benefit of the 1963 filing date under 35 USC 120, <sup>n13/</sup> and therefore the Netherlands patent is not available as a prior art reference.

<sup>n13 /</sup> § 120. Benefit of earlier filing date in the United States.

An application for patent for an invention disclosed in the manner provided by the first

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*paragraph of section 112 of this title in an application previously filed in the United States by the same inventor shall have the same effect, as to such invention, as though filed on the date of the prior application, if filed before the patenting or abandonment of or termination of proceedings on the first application or on an application similarly entitled to the benefit of the filing date of the first application and if it contains or is amended to contain a specific reference to the earlier filed application.* [Emphasis added.]

[\*\*15]

The examiner and the board were of the view that the claims are not entitled to the 1963 filing date because the presently claimed subject matter is not "described" in the 1963 application as required by the first paragraph of 35 USC 112. *n14/* As explained by the board:

The question determinative of the issue at hand is thus whether or not appellants are entitled to the filing date of their parent application Serial No. 295,519, i.e., July 16, 1963. An answer to this question quite obviously depends on what is the invention defined by the instant claims. Is it the same as the one disclosed in [the] parent case or does it differ therefrom in a manner which precludes the instant claims from being afforded the filing date of the parent case?

Under the rationale of the CCPA as set forth in *In re Welstead*, 59 CCPA 1105, 463 F.2d 1110, 174 USPQ 449 (compare also *In re Lukach et al.*, 58 CCPA 1233, 442 F.2d 967, 169 USPQ 795, and *In re Smith* [(I)], 59 CCPA 1025, 458 F.2d 1389, 173 USPQ 679), which we deem controlling, we are constrained to conclude that the present claims are not entitled to the filing date of appellants' parent case Serial No. 295,519. The claims [\*\*16] at issue contain provisos that E and E' may not both include a divalent sulfone group and may not both include a divalent carbonyl group linking two aromatic nuclei. The artificial subgenus thus created in the claims is not described in the parent case and would be new matter if introduced into the parent case. It is thus equally "new matter," i.e., matter new to the present application for which no antecedent basis exists in the parent case. Consequently, appellants are not entitled to rely on the filing date of their parent case to support a new subgenus for which no basis exists in the parent case. The reason why appellants now limit their claims to exclude those species eliminated by the provisos, i.e., loss in an interference, is manifestly immaterial.

Having reached the conclusion that appellants are not entitled to the filing date of their parent case for the subject matter defined by the present claims which delineate a new subgenus not described in the parent case, it follows that the Netherlands patent is a valid

reference which, by appellants' own admission, fully meets the claims. The indicated rejection of claims 1-9, 64 and 68-70 under 35 U.S.C. 102 as unpatentable [\*\*17] over the Netherlands patent is thus affirmed. The alternative reliance by the Examiner on Section 103 is inconsequential, Section 102 of the statute being the epitome of Section 103. *In* [\*1015] *re Pearson*, (CCPA), 494 F.2d 1399, 181 USPQ 641.

#### *n14/* § 112. Specification.

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention. [Emphasis added.]

Claims 64 and 68-72 were rejected under 35 USC 112, first and second paragraphs. In his Answer, the examiner stated that the claims were rejected under § 112, first paragraph, for "being broader than the enabling disclosure" and under § 112, second paragraph, *n15/* for being "broader than the [\*\*18] express limitations disclosed as defining the invention." The examiner said the "specific deficiencies of the claims and disclosure" are that the expression "to activate a halogen" (claim 64) is "indefinite" because "it does not specify toward what the activation is" and that "[the] express disclosure is clearly limited to the sigma [\*] value recited in claim 1, for example: see [[A] and [B]]."

#### *n15/* § 112. Specification.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

In affirming the examiner on these rejections, the board stated:

Further, claims 64 and 68-72 stand finally rejected under 35 U.S.C. 112 as being broader than the enabling disclosure (first paragraph) and broader than the express limitations disclosed as defining the invention (paragraph two).

It is the Examiner's position that "to activate a halogen atom" (claim 64) is indefinite and that the disclosure [\*\*19] also is limited to dihalobenzenoid compounds not broadly merely "activated by an inert

electron withdrawing group" (claims 68-72) but the activation must have a sigma \* value above about +0.7.

We agree with this rejection. The specification makes it quite clear that a minimum sigma \* activation value of the halogen atoms is required (note especially [[A]]) and an undefined sigma \* value thus lacks the requisite preciseness commensurate with the enablement of the disclosure.

#### OPINION

##### I. The Rejections of Claims 64 and 68-72 under § 112

Claims 64 and 68-72 were rejected under both the first and second paragraphs of 35 USC 112.

We begin with the rejections under the second paragraph of § 112. As stated in *In re Moore*, 58 CCPA 1042, 1046-1047, 439 F.2d 1232, 1235, 169 USPQ 236, 238 (1971):

Any analysis in this regard should begin with the determination of whether the claims satisfy the requirements of the second paragraph. \*\*\*

This first inquiry therefore is merely to determine whether the claims do, in fact, set out and circumscribe a particular area with a reasonable degree of precision and particularity. It is here where the definiteness of the language [\*\*20] employed must be analyzed--not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art. [Footnote omitted.]

The examiner's § 112, second paragraph, rejection was premised on the general ground that the claims are "broader than the express limitations disclosed as defining the invention" and on two specific grounds: (a) that the expression "to activate a halogen atom" is "indefinite" because "it does not specify toward what the activation is;" and (b) that "[the] express disclosure is clearly limited to the sigma \* value recited in claim 1, for example: see [[A] and [B]]." The board affirmed and stated: "an undefined sigma \* value thus lacks the requisite preciseness \* \* \*." (Emphasis added.)

Ground (a) focuses on the specific phrase "to activate a halogen atom." But the language is found only in claim 64, not in claims 68-72. Claim 68 recites "a dihalobenzenoid compound having halogen atoms activated by an inert electron withdrawing group," and claims 71 and 72 have a similar recitation. (Claims 69 and 70 depend [\*\*21] from [\*1016] claim 68.) Those recitations clearly specify "toward what the activation is," as the examiner would require. Ground (a), therefore, lacks merit with respect to claims 68-72.

Product claim 64 *n16*/ defines the complete polymer structure by describing the constituents partially in terms of their functions in the reaction and by their linkage into the end-product polymer. The

specification provides further guidance on the meaning of the E' term:

It is seen also that as used herein, the E' term defined as being the "residuum of the benzenoid compound" refers to the aromatic or benzenoid residue of the compound *after the removal of the halogen atoms on the benzenoid nucleus*. [Emphasis added.]

*n16* / Claims 68-70 are product-by-process claims.

It is also clear from the specification as a whole, that two keys to the polymerization reaction are inert electron withdrawing groups particularly positioned on the benzenoid nucleus and a cumulative sigma \* value attributable to those [\*\*22] withdrawing groups which is sufficient to activate a halogen atom on that nucleus. If the sigma \* value is not sufficient to activate a halogen atom on the benzenoid nucleus, the reaction will not take place and the polymer will not be made. See *In re Angstadt*, 537 F.2d 498, 190 USPQ 214 (CCPA 1976). The specification adequately details which sigma \* values are sufficient to carry out the reaction, and any person skilled in the art would immediately recognize from the above-quoted portion of the disclosure or the specification as a whole that the halogen atom mentioned in claim 64 was on the benzenoid nucleus prior to the reaction. It is clear that those skilled in the art would have no trouble ascertaining whether any particular polymer falls within the scope of claim 64. See *In re Goffe*, 526 F.2d 1393, 188 USPQ 131 (CCPA 1975). The questioned limitation is merely surplusage, since the claim would be definite with or without it. *n17*/

*n17* / We do not speculate on whether or not the claim would be unduly broad if the questioned limitation were removed. But undue breadth is not indefiniteness. *In re Borkowski*, 57 CCPA 946, 422 F.2d 904, 164 USPQ 642 (1970). This claim is definite either with or without the phrase "to activate a halogen atom."

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The point made by the board, that "an undefined sigma \* value" lacks "preciseness," is also unsound. *n18*/ Claim language must be read in light of the specification as it would be interpreted by one of ordinary skill in the art. *In re Moore, supra*. As pointed out above, those skilled in the art will be able to determine immediately from appellants' detailed specification what level of activation (i.e., sigma \* value) is necessary to practice the invention. Cf. *In re*



*Mattison*, 509 F.2d 563, 184 USPQ 484 (CCPA 1975). We conclude that the subject matter embraced by claims 64 and 68-72 is definite and that the claims set out and circumscribe a particular area with a reasonable degree of precision and particularity. *In re Angstadt*, supra; *In re Skoll*, 523 F.2d 1392, 187 USPQ 481 (CCPA 1975); *In re Watson*, 517 F.2d 465, 186 USPQ 11 (CCPA 1975); *In re Moore*, supra. Therefore, the rejection of claims 64 and 68-72 under the second paragraph of 35 USC 112 is reversed.

n18 / *In re Merat*, 519 F.2d 1390, 186 USPQ 471 (CCPA 1975), cited by the Solicitor, affirmed a § 112, second paragraph, rejection because the same word ("normal") was used in the claims in one sense and in the specification in a different sense, thus rendering the claims indefinite. There is nothing akin to the *Merat* situation here.

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The examiner's general ground and his ground (b) raise a lack of enablement issue properly arising under the first, not the second, paragraph of § 112. Ground (b) simply supplies the examiner's reasoning in support of the rejection of the claims under § 112, first paragraph, as "broader than the enabling disclosure."

As appellants state, the crux of this lack of enablement rejection is that although the specification describes how the halogen atoms bonded to the dihalobenzenoid compound (the E' precursor compound) must be activated in order for polymerization to occur, [\*1017] the claims at issue do not recite a numerical definition of the degree of activation (a minimum sigma \* value) required from the electron withdrawing group. The PTO position is that the claims must recite a minimum sigma \* value in order to conform the scope of the claims to the scope of enablement provided by the specification. The PTO relies on statements [A] and [B] to prove that the scope of enablement provided by the specification is not commensurate with the scope of the claims.

First, we note that it is the function of the specification, not the claims, to set forth the "practical" [\*25] limits of operation" of an invention. *In re Rainer*, 49 CCPA 1243, 1248, 305 F.2d 505, 509, 134 USPQ 343, 346 (1962). One does not look to claims to find out how to practice the invention they define, but to the specification. *In re Roberts*, 470 F.2d 1399, 1403, 176 USPQ 313, 315 (CCPA 1973); *In re Fuetterer*, 50 CCPA 1453, 319 F.2d 259, 138 USPQ 217 (1963).

Second, we note that the specification as a whole must be considered in determining whether the scope of enablement provided by the specification is commensurate with the scope of the claims. *In re*

*Moore*, supra at 1047, 439 F.2d at 1235, 169 USPQ at 238-39.

The present specification includes broad statements such as: "Any electron withdrawing group can be employed as the activator group in these compounds." The specification also discusses preferred embodiments, alternative embodiments, and the practical limits of operation.

Statement [A] describes preferred embodiments and practical limits of operation. It says that electron withdrawing groups having a high sigma \* value ("preferably above 1.0") are preferred and that the practical limit of operation of the polymerization reaction is reached when the [\*26] electron withdrawing group has a sigma \* value of 0.7 (at that value the reaction rate "may be somewhat low").

Statement [B] describes an alternative embodiment ("a plurality of electron withdrawing groups") and the practical limit of operation for this embodiment. It states that the cumulative sigma \* influence should be "at least about +0.7."

The PTO would limit appellants to claims reciting a sigma \* value of at least 0.7. This view is improper because it requires the claims to set forth the practical limits of operation for the invention and it effectively ignores the scope of enablement provided by the specification as a whole. As we said in *In re Goffe*, 542 F.2d 564, 567, 191 USPQ 429, 431 (CCPA 1976):

[To] provide effective incentives, claims must adequately protect inventors. To demand that the first to disclose shall limit his claims to what he has found will work or to materials which meet the guidelines specified for "preferred" materials in a process such as the one herein involved would not serve the constitutional purpose of promoting progress in the useful arts. See *In re Fuetterer*, 50 CCPA 1453, 1462, 319 F.2d 259, 265, 138 USPQ 217, 223 (1963). [\*27] [Footnote omitted.]

The rejection of claims 64 and 68-72 under the first paragraph of 35 USC 112 is reversed.

II. *The Rejection of Claims 1-9, 64, and 68-70 Under § 102 or § 103, Raising Issues Under § 112 and § 120*

We are convinced that the invention recited in claim 1 is "disclosed in the manner provided by the first paragraph of section 112" in the 1963 application and that claim 1 is therefore entitled to the benefit of the 1963 filing date. n19/ The only inquiry is whether, after exclusion from the original claims of two species specifically disclosed in the 1963 application, the 1963 disclosure [\*1018] satisfies § 112, first paragraph, for the "limited genus" n20/ now claimed.

n19 / Appellants have not argued the claims separately, thus, claims 2-9, 64, and 68-70 stand or fall with claim 1.

n20 / Appellants refer to the subject matter recited in claim 1 as a "limited genus." The board called it an "artificial subgenus." We use appellants' terminology. Whatever the label, the issue is the same.

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While the board found that "no antecedent basis exists in the parent case" for the "limited genus" in claim 1, we see more than ample basis for claims of such scope. The 1963 disclosure is clearly directed to polymers of the type claimed. Fifty specific choices are mentioned for the E precursor compound, a broad class is identified as embracing suitable choices for the E' precursor compound, and twenty-six "examples" are disclosed which detail fifteen species of polyarylene polyethers. Only fourteen of those species and twenty-three of the "examples" are within the scope of the claims now on appeal. Two of the many choices for E and E' precursor compounds are deleted from the protection sought, because appellant is claiming less than the full scope of his disclosure. But, as we said in *In re Wertheim*, 541 F.2d 257, 263, 191 USPQ 90, 97 (CCPA 1976):

Inventions are constantly made which turn out not to be patentable, and applicants frequently discover during the course of prosecution that only a part of what they invented and originally claimed is patentable.

It is for the inventor to decide what bounds of protection he will seek. *In re Saunders*, [\*\*29] 58 CCPA 1316, 1327, 444 F.2d 599, 607, 170 USPQ 213, 220 (1971). To deny appellants the benefit of their grandparent application in this case would, as this court said in *Saunders*:

\*\*\* let form triumph over substance, substantially eliminating the right of an applicant to retreat to an otherwise patentable species merely because he erroneously thought he was first with the genus when he filed.

The board cited as "controlling" the decisions of this court in *In re Welstead*, 59 CCPA 1105, 463 F.2d 1110, 174 USPQ 449 (1972); *In re Lukach*, 58 CCPA 1233, 442 F.2d 967, 169 USPQ 795 (1971); and *In re Smith*, 59 CCPA 1025, 458 F.2d 1389, 173 USPQ 679 (1972). Those decisions, because of important factual distinctions, are not controlling.

In *Welstead* the applicant was attempting to introduce into his claims a new subgenus where "\*\*\* the specification \*\*\* contained neither a description \*\*\* of the [subgenus] \*\*\* nor descriptions of the species thereof amounting in the aggregate to the same

thing \* \* \*." Welstead conceded the absence from his disclosure of compounds of the "second type" within the new subgenus. Welstead is thus clearly distinguishable from [\*\*30] the present case, in which appellants' grandparent application contains a broad and complete generic disclosure, coupled with extensive examples fully supportive of the limited genus now claimed. Indeed, *Welstead* might have well been cited by the board in support of a decision contrary to that reached, in view of what this court there implied concerning the possibility that "descriptions of species amounting in the aggregate to the same thing" may satisfy the description requirements of 35 USC 112, paragraph one.

Similarly, in *Lukach* we noted that "\*\*\* the grandparent application here does not disclose any defined genus of which the presently claimed copolymers are a subgenus." That is not the fact here. Appellants' grandparent application clearly describes the genus and the two special classes of polymer materials excluded therefrom.

In *Smith* the applicant sought the benefit of his prior application for a broadened generic claim, replacing the claim limitation "at least 12 carbon atoms \* \* \*" with a new limitation calling specifically for 8 to 36 carbon atoms, where there was no disclosure of either the range itself or of a sufficient number of species to establish [\*\*31] entitlement to the claimed range. Appellants, in contrast to the applicant in *Smith*, are narrowing their claims, and the full scope of the limited genus now claimed is supported in appellants' earlier application, generically and by specific examples. [\*1019]

The notion that one who fully discloses, and teaches those skilled in the art how to make and use, a genus and numerous species there within, has somehow failed to disclose, and teach those skilled in the art how to make and use, that genus minus two of those species, and has thus failed to satisfy the requirements of § 112, first paragraph, appears to result from a hypertechnical application of legalistic prose relating to that provision of the statute. All that happened here is that appellants narrowed their claims to avoid having them read on a lost interference count.

The board indicated that "it is manifestly immaterial" why appellants limited their claims. Though it is true that insufficiency under § 112 could not be cured by citing the causes for such insufficiency, it is not true that the factual context out of which the question under § 112 arises is immaterial. Quite the contrary. Here, as [\*\*32] we hold on the facts of this case, the "written description" in the 1963 specification supported the claims in the absence of the limitation, and that specification, having described the whole, necessarily described the part remaining. The facts of the prosecution are properly presented and relied on, under these circumstances, to indicate that

appellants are merely excising the invention of another, to which they are not entitled, and are not creating an "artificial subgenus" or claiming "new matter."

In summary, and for the reasons discussed, the rejections of claims 64 and 68-72 under § 112, first and second paragraphs, are *reversed*; appellants' 1963 disclosure satisfied § 112, first paragraph, with respect to claims 1-9, 64, and 68-70 and appellants are, therefore, entitled to the benefit of their 1963 filing date under 35 USC 120. The Netherlands patent is thus rendered unavailable as a prior art reference, and the rejection of the claims under 35 USC 102 or 103 is *reversed*.

*REVERSED*

**DISSENTBY:**

LANE (In Part)

**DISSENT:**

LANE, Judge, dissenting in part,

I would affirm the rejection of claims 64 and 68-72 under § 112, paragraphs 1 and 2, because the specification indicates [\*\*33] that a minimum sigma value of +0.7 is an *essential requisite*. These claims fail to recite this requisite, thus fail to define appellants' invention and are broader than the disclosure. I concur in reversing the rejection of claims 1-9.

